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ABSTRACT

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Recall of Nonsense Syllables of Normal and Learning Disabled Adolescents by Equating Learning Through Mastery

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Running Head: Retention Similarities of Learning Disabled and Normal Comparison

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Abstract

This study compared normal and learning disabled eighth graders as to their retention of nonsense syllables once mastery learning occurred. The groups were equated by intelligence, age, and sex and were presented ten nonsense syllables to be remembered. Each group studied the material until a predetermined percentage of the words could be recalled. They were then asked to reproduce the information twenty-four hours, forty-eight hours, and seven days later. It was concluded that both groups remembered a similar percentage of material.

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Problem Situation

Why research adolescent retention capabilities? This question is an important reflection upon teaching experience. Teachers see the trials and frustrations of learning disabled students trying to gain proficiency in reading, math, spelling, writing, and composition, only to be unable to recall the previously learned skills. Through research, some student frustration may be able to be diverted through increasing retention rate by discovering more about the memory of the learning disabled student.

Research has shown consistent differences in the speed of information obtained by the intelligence factor. Although the newest thrust in education is to aid the handicapped learner, no research exists showing the learners' ability to retain the information (Bloom, 1968; Gillette, 1936). If concentrated effort is being made to teach younsters it would be concerting to know that the information being taught would also be retained. It would also be revealing to know whether students, after learning materials at their individual rates, would remember similar percentages of the original materials, if one group was learning disabled and the other "normal." In conclusion, learning rate differences are present between some normal and learning disabled adolescents, however it does not follow that similar differences exist in memory.

Problem Statement

Does the retention rate of learning disabled and

normal adolescents differ if learning has been mastered?

Research of Literature

A question that deserves close investigation is, what is the difference between individual learning ability and recall? The differences in the rate by which individuals obtain information is generally observable and understood. However, concluding that these differences exist in memory is not substantiated. It can be theorized that normal and learning disabled children retain information at the same rate. This question gains importance when reflecting upon the time, money and effort exposed to disagnosed learning disabled children.

Early studies (Gillette, 1936) indicated fast learners retain more than slow learners. This was widely substantiated by inclusion in psychology of education texts (Underwood, 1954). However there is other research opposing (Gregory and Bunch, 1959; Stoud and Schoer, 1959; Underwood, 1954) this concept. This research concept (Bloom, 1968; Klausmeier, 1959; Shuell and Keppel, 1970) has determined fast and slow learners forget at the same rate.

When considering a question of this nature it is important to distinguish between learning and retention (Underwood, 1964). While retention is measured from the learning performance, it is not correct to conclude learning and retention are a continuous process. Learning research is centered around task acquisition, while retention research is concerned with material recall once it has been learned. The retention interval required during acquisition is small, thirty seconds, however the time interval appropriate to measure recall could be an hour or days. There arrives a distinction

between short-term and long-term memory which is essential to classroom recall and learning.

If differences in retention are to be measured, then Ss learning must be demonstrated. Reflecting upon this original learning becomes extremely important (Bloom, 1968; Scuell1 and Keppel, 1970; and Underwood, 1964). Bloom (1968) supports the position that to measure fast and slow learners' retention, mastery must first take place. He further states differences do occur in the time needed to achieve mastery between fast and slow learners, however this does not effect retention rate. Mastery learning is an excellent method of determining retention rate between groups or individuals.

Further investigation indicates (Gregory and Bunch, 1959; Schoer, 1962; Stoud and Schoer, 1959; Underwood, 1964) fast and slow learners forget at the same rate. Klausmeier Feldhausen, and Check (1959) found the retention rate differences in children of low, average, and high intelligence were proportionally equal. Further research (Schvell and Keppel, 1970) exhibits the fact that fast learners acquired more, but were unable to recall a significantly greater amount than the slow learners.

In this study learning performance is equated. This was done to measure the difference in learning disabled and normal adolescent retention rate.

Hypothesis

The major hypothesis which is being tested is that normal and learning disabled adolescents will have the same retention rates once mastery is established, given ten nonsense syllables and asked to recall them.

Definition of Terms

Learning disability: A child who has normal or above average intelligence, but is lacking in expected academic grade level skill development. The child will demonstrate perceptual difficulties in such areas as visual, auditory, or motor. The child is diagnosed using intelligence assessments such as the WISC, WAIS, Slosson, PPVT, and academic achievement and diagnostic tests such as the PIAT, Key Math, WRAT, Woodcock Reading Tests. Tests which assess various learning abilities such as the I.T.P.A. and the Detroit may be used in the educational diagnosis, as are instruments which assess motor abilities such as the Slery or Bender.

Learning disability resource room: A self-contained room with educational materials arranged in a manner as to enhance academic skill development. Students are scheduled five days a week for one school period (approximately fifty minutes) and in a class group of between 5-10. They all have individual academic programs designed to benefit the major deficit area.

Learning disability teacher: A teacher who is specially trained to diagnose and remediate children who have learning disabilities.

Nonsense syllables: Syllables using CVC (consonant-vowel - consonant) patterns that have no meanings.

Retention: The mental process of maintaining and duplicating previously learned stimuli. This process duplicates or recognizes previously learned stimuli.

Mastery learning: The learning of a stimulus to predetermined, specified percentages.

Free recall: The mental process of retrieving previously learned stimulus without any cues.

Research Approach

The experimental design was pretest - treatment - posttest with pretest being equating group mastery of the purposely selected groups.

Instruction Mastery O_1 X O_2

Instruction Mastery O_3 X O_4

Experiment

Method

Research Design

The experimental design is bascially a 2 X 3 factorial design with two types of learning groups (as determined by previous diagnosis) and three free recall tests. The independent variable is the time intervening between mastery and retention testing. The dependent variable is the production of the nonsense syllables as measured by a retention test.

Selection of Subjects

The Ss for this experiment were forty-six eighth graders from one secondary school. The study took place in an open secondary public school in a suburban, upper middle class income, predominately White area. The learning disability group (From here on referred to as Group I) was chosen because they are the largest single group among the sixty already diagnosed children at the school. The normal group (from here on referred to as Group II) was chosen by class availability and matched individually and by group for intelligence, sex, and age. Each group consisted of six females and seventeen males. The age of Group I was X = 14.3 and for Group II X = 13.9. The mean I.Q. of the group as determined by the Standard Test of Educational Ability Subtest of the Science Research Associates Achievement Test

was Group I Raw Score: X = 33, I.Q. = 102; Group II Raw Score: X = 34, I.Q. = 104. The mastery learning took place in respective classrooms; the learning disabled group in the resource room, which is a self-contained classroom and the normal group in the usual open classroom. All Ss were given the experimental test in the same environment they achieved mastery. A record was kept of the time needed to achieve mastery of both groups.

Statistical Hypothesis

When given ten nonsense syllables and asked to recall them, normal and learning disabled students will have no difference in retention rate.

Instrumentation

A single list of ten nonsense syllables was selected from (Philipchalk and Begg, 1971) another study using meaningless words. The same list in the same order was presented visually until group mastery was achieved. All ten words are patterned CVC (consonant - vowel - consonant). They are GAC, JIY, FEB, VOB, CEH, RUV, DAJ, NUQ, COF, and HIW. The test was objectively graded using correct duplication of the nonsense syllables as the scoring procedure.

Operational Definitions

Free recall: The written expression of nonsense syllables without any cues.

Retention: The memory maintenance of ten nonsense syllables, i.e. the number of "words" correctly reproduced.

Normal adolescents: The Ss who have not been diagnosed to take part in the learning disability resource program.

Learning disabled adolescent: The Ss who have

been diagnosed by the learning disabilities teacher and who attends the resource program.

Mastery: 91% recall after the instruction and 80% recall 24 hours after instruction.

Procedures:

All Ss were presented with ten nonsense syllables, handed to them on a 4" by 11" sheet of paper; the syllables were also written on the chalkboard and pronounced. The Ss were instructed to learn the nonsense syllables as quickly and the best way they could. Five suggestions were made about how to learn them such as by writing them continuously, writing them alongside the word list, tracing over the word list, saying them to themselves or by looking and writing. They were told to learn them in their own individual way and that they would not have to duplicate them in order.

On a Monday, Group I was given a thirty minute learning period and was tested followed by another twenty minute period, plus testing. The next day (twenty-four hours later), Group I was given another thirteen minute learning period. They were tested and met the first step on the mastery definition. This group was retested one, two, and six days later.

Group II had an initial twenty minute learning session followed by testing and another fifteen minute learning period followed by the test and met the first criteria. Twenty-four hours later, Group II met the second half of the definition and was tested one, two, and six days later. All Ss were asked to replicate ten nonsense syllables on 4" by 11" paper

sheet with ten lines on it.

The mastery level was considered 91% correct responses for the group. The mastery level was determined by two performance factors. The normal group reached 91% correct response the first day with twenty-five minutes of instruction time, while the learning disability group had 90% correct response after fifty minutes and was allowed thirteen minutes more the next day and reached a 91% mastery level. Each group, on the successive day (after 91% correct response), obtained an 81% level portraying mastery. The twenty-four hour period without instruction was determined as mastery.

The learning disability group was instructed in small groups within the self-contained resource room, while the normal group was instructed entirely in the regular classroom. All Ss were instructed during their normal respective class assignment.

Statistical Analysis

Analysis of covariance will be the statistical test (Shvell and Keppel, 1970). Further analysis among the groups will be made using Pearson Product Correlation to determine test-retest reliability.

Limitations

Internal Validity

Contemporary history: The study is short-term, ruling out a great deal of history interference; however history cannot be completely controlled. Different factors will effect each subject between the start and finish of the seven day experiment.

Maturation process: Study is short term, therfore maturation should not be a major confounding variable.

Pretesting: There is no pretest to make subjects

more sensitive to treatment or to the effects of treatments. All subjects receive same mastery process.

Measurement instruments: The measurement instruments are objective and have specific grading criteria which are inalterable.

Statistical regression: The groups were not selected because of a display of extreme scores.

Differential selection of subjects: The use of nonsense syllables precludes previous learning as predisposing either group. Groups were equated at outset and no pretest was given.

Differential experimental mortality: Subjects not available on retest days could be a problem. It is always possible someone will be absent from school on a given day, however absenteeism is not presently a problem.

Interaction of selection and maturation, selection and history: The Ss will be equated on sex, intelligence, and group mastery but other interacting variables such as motivation and behavior might confound the study. Variables outside the experimental control could confound the study.

External Validity

Interaction effects of selection biases and X: The learning disabled students are a purposive selection while the control group is from a random selection based on convenience. True randomization is not achieved. The generalizability is hindered by the school being an open concept. Expectations appear to be above average. It is a suburban, predominately White, upper middle income community.

Reactive or interaction effect of pretesting: The Ss will not know the purpose of the lesson (experiment). They will be aware something different is occurring. The S_s observation that something different is happening

to them could change their behavior or attitude.

Multiple - treatment interference: The treatment will be exposed a few times. However the practice in retention studies have proven not to be a confounding variable.

Experimenter or Rosenthal effect: The experimenter bias is a variable needing close attention. Since the evaluator, implimentor, and instructor are the same person, the results could reflect unintentional predispositional motivation.

Results

This study sought to equalize acquisition of knowlege of the learning disabled and normal Ss by using mastery learning technique. Mainly, normal and learning disabled adolescents will have the same retention rates once mastery is established, given ten nonsense syllables and asked to recall them. Mastery was determined to be a specified number of correct responses which demonstrate recall ability. Each experimental condition had an equal number of Ss, therefore analysis of covariance was used to analyze the data. The dependent variable was the number of words recalled on the retention test; the covariate was the number of words correct on the second mastery test

Insert table 1 about here.

The normal group achieved (Table 1) a mean of 9.13, S.D. = 1.06 with a single thirty-five minute study session, while the learning disabled group needed two days, totaling sixty-five minutes of study sessions to reach the mean = 9.09, S.D. = 1.4., p = .999. A twenty-four hour period elapsed to determine the mastery level and Group One's (the learning disabled adolescents) mean was 7.91, S.D. + 2.46 and for Group II (the normals) the mean was 8.39, S.D. = 2.16. There was no significant

difference between the means, p = .999. The essential criteria for equating knowledge was satisfied and successive testing, based upon the mastery assessment, was done twenty-four hours, forty-eight hours, and seven days later.

Group One showed a mean performance of 7.65, S.D. = 2.97, While Group Two's mean was 8.39, S.D. = 2.27 twenty-four hours after reaching mastery level. The mean performance for each group after forty-eight hours was: Group One: 8.26, S.D. = 2.24 and Group Two: 8.73, S.D. = 2.24. On the forty-eight hour test the means rose instead of declined, (Table 1) which is unusual for retention testing. On the third and final test, each group still retained substantial knowledge with the learning disabled group achieving a greater mean: 7.56, S.D. = 2.64 (Table 1). The normal group's mean was 7.39, S.D. = 2.44, however there was no significant difference between the mean, p = .999.

Insert Table 4 about here.

The product moment correlation coefficient between the tests (table 2) are not significant, with the exception of the twenty-four hour and seven day recall tests (r = .56). The question raised of the data is the extent to which Ss retained the same relative order on the recall tests. If the individual differences in retention are small, the correlation should be high between the mastery pretests and subsequent tests. All Ss were used for calculating the correlation coefficients and these are presented in Table 2.

Insert Table 2 about here.

There are several possible explanations for the lower correlations on the recall tests. One possibility of course, is that the low value is a result of the reduction in the reliability of the test over the retention period. Another factor might be due to

individual differences in retention. In any case, control should be optimized for this effect.

Analysis of covariance was used to determine if similarities existed between the groups' recall. The groups were adjusted for the small difference between the learning disabled and the normals on the second mastery pretest (used to determine retention rate differences). The analysis of corvariance exhibited there were no significant differences between each group's mean. There were no significant differences of the dependent variable (Table 3). All F values were less than 1. The twenty-four hour recall test exposed F = .663, d f = 1/46.

Insert Table 3 about here.

Similar results were obtained for the forty-eight hour test (F = .722, d f = 1/46) and the seven day recall test (F = .066, d f = 1/46). Clarification should be stated about the seven day recall test; the test is actually seven days from initial exposure to the learning and six days from the mastery level. Attention should be drawn to the fact that the P values were .999 and reflect no significant difference between the means. Therefore, the conslusion that there was no significant difference between the groups' retention rates is drawn, p = .999.

Discussion

This study indicates the normal and learning disabled adolescent's rate of retention were negligible, once initial learning was equated. This research expands the bases for retention similarities (Gregory and Bunch, 1959; Schoer, 1962; Stoud and Schoer, 1959) between different ability groups and (Shuell and Keple, 1970; Underwood, 1965) original learning. Further, difference in learning rates clearly occur, however retention rate differences are not

apparent.

Although upon face evaluation the differences between obtaining information and retention of it seem locked together, they are in actuality, not. The speed in which the Ss grasped the materials did not necessarily influence later reproduction. Hence, those who take longer to achieve the same result will be able to reproduce similar or superior quality.

The implications are that retention is a crucial aspect of the learning process. Learning per se would not serve a purpose if the input was not remembered. In other words, a change in behavior (learning) is in itself superfluous if the change disappears entirely over a short period of time. Relearning would become unnecessary if the change in behavior could linger in whole or part for a substantial period or reappear when the stimulus appeared. Mueller (1974) found retention is a necessary part of learning and an awareness of how retention can be increased would contribute greatly to teacher effectiveness.

The ability to learn varies in each student, but it is not necessarily true that retention ability varies directly with learning ability. This theory was investigated by Shuell and Keppel (1971) when they equated information learned from two different learning ability groups; the rate of retention remained the same. Shuell and Keppel's idea of fast and slow learner's retention as being similar is further supported by other (Shvell and Giglio, 1973) research. Shuell and Giglio (1973) explain that fast learners seem to retain more because they learn quicker and better apply information. The implication of this research is that slow and fast learners can acquire the same knowledge, however slower learners will need additional time and different methods.

The results of this study indicate that learning disabled adolescents, given the proper time to learn, can achieve as others of the same intelligence. This result gives credence to the tremendous effort upon helping the learning handicapped youngster. Moreover, the realization that the learning disabled child can meet the requirements of learning per se as others do, (with special consideration given for deficiencies) creates the hope for success. Further research should explore the similarities between the learning disabled and normal children, exposing the abilities of the learning disabled children.

While the learning disabilities field is continually making a greater impact upon the general field of education, evidence in the past has been slight to advance the practicality of the intrusion of extensive and intense additional instruction. The questions which arise from the intervention of learning disabilities specialists have not been clearly asserted. The entire area has not been clearly discerned as an aid to the student. It is supposed that further investigation be expected to gather evidence that the additional assistance the diagnosed learning disabled receives, is generally valuable.

Further, the need to unequivocally prove that removing the student from regular class instruction is valuable in enhancing academic skill is still unanswered. Research needs to enter the area of how and what ways do learning disabled students learn most efficiently. The area of retention is unparalleled in importance however and little is known about the learning disabled student's retention and acquisition of knowledge.

Moreover the basic thrust in this study differs from other retention research concentrating upon "fast" and "slow" learners' acquisistion rates. This research

concentrated upon the retention research comparing normal and learning disabled Ss. This comparison is relevant to the current concern the education field has recently gained about children's learning problems. By initially equating learning by instructing to a mastery level, the two groups were blanced statistically for small pretest differences and it was statistically proven no difference existed between the two groups' retention rates.

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Table 1
Mean Number and Standard Deviation of Nonsense Syllables Recalled

Groups	n	Test Periods							
		Mastery		24 Hour Recall		48 Hour Recall		7 Day Recall	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Normal	23	8.39	2.16	8.39	2.27	8.73	1.78	7.39	2.44
L.D.	23	7.91	2.46	7.65	2.97	8.26	2.24	7.56	2.64
Both Groups	46	8.15	2.30	8.02	2.64	8.50	2.01	7.47	2.51

Note: Maximum score = 10

Table 2

Product - Moment Correlation Coefficient Between Performance on the Mastery Tests and Recall Tests

Tests	n	24 Hour Recall	48 Hour Recall	7 Day Recall
Mastery	46	0.20	-0-0.07	0.04
24 Hour Recall	46		-0.38	0.56•
48 Hour Recall	46			-0.25

• positive significance

Table 3

Analysis of Covariance Between Learning Disabled and Normal Adolescents on the Recall Tests Adjusted by Mastery Pretest 2

Source	Adjusted d f	Adjusted M S	P
Recall after 24 Hours	1	4.583	0.663
Recall after 48 Hours	1	3.014	0.722
Recall after 7 days	1	0.434	0.066

analysis shows no difference between significance of P at .999.